DOCUMENT RESUME

ED 057 886 PS 005 103

AUTHOR Keislar, Evan R.; Phinney, Jean
TITLE Manipulation and Novelty of Reward as Features in Educational Games.
INSTITUTION California Univ., Los Angeles.
SPONS AGENCY Office of Economic Opportunity, Washington, D.C.
PUB DATE Aug 70
NOTE 14p.

EDRS PRICE MF-$0.65 HC-$3.29
DESCRIPTORS Childrens Games; Disadvantaged Youth; *Educational Games; Instructional Materials; *Listening Comprehension; *Listening Skills; Motivation; *Preschool Children; *Rewards
IDENTIFIERS Project Head Start

ABSTRACT

This experimental study investigates differences between a game approach and a programmed learning approach in teaching three listening comprehension skills (negation, exclusion, joint denial) to a total of 13 4- or 5-year-old Head Start children. It was hypothesized that (1) manipulation and novelty of reward would influence children to choose an educational game more frequently than they would an instructional program, and (2) children would show gains from the game approach which would be equal or greater than those obrained with a programmed learning approach. A pilot study helped establish puzzles and procedures for the main experiment. In this experiment, each child played the Make-a-Picture Game. He indicated his comprehension of cues played on an audio flashcard by placing puzzle pieces correctly into a frame. The alternative approach required the child to mark a picture in a workbook corresponding to audio flashcard cues. Criterion tests of listening comprehension and activity preference indicated that children showed no preference for an educational game over an instructional program and both groups of children made significant gains on pretest-posttest measures of language comprehension. The investigators conclude that the number of subjects was not large enough to provide a satisfactory test of the hypotheses. (WY)

F-OEO
PS

U.S. DEPARTMENT OF HEALTH,
EDUCATION & WELFARE
OFFICE OF EDUCATION
THIS DOCUMENT HAS BEEN REPRODUCED EXACTLY AS RECEIVED FROM THE PERSON OR ORGANIZATION ORIGINATING IT. POINTS OF VIEW OR OPINIONS STATED DO NOT NECESSARILY REPRESENT OFFICIAL OFFICE OF EDUCATION POSITION OR POLICY

ED057886

MANIPULATION AND NOVELTY OF REWARD AS FEATURES IN EDUCATIONAL GAMES[1]

by

Evan R. Keislar and Jean Phinney

University of California, Los Angeles

August, 1970

PS005103

[1]The work reported herein was carried out at the Early Childhood Research Center, Dr. Carolyn Stern, Director. This Center is funded by Grant CG 9938 from the Office of Economic Opportunity.

MANIPULATION AND NOVELTY OF REWARD AS FEATURES IN EDUCATIONAL GAMES

One of the major advantages of educational games is the interest which is generated by the game situation. Several studies (e.g., Boocock, 1968; Farren, 1968) have demonstrated that students find the activity of educational games highly attractive. While this emphasis on process is distinct from attitudes toward the subject or what is being learned, it represents an important feature of a program; if any educational situation is attractive and enjoyed, it will be sought by students and the opportunity to learn a variety of outcomes is increased.

There is a danger that the child, by virtue of his interest in the game, will pay too much attention to the non-educational aspects of the situation, such as the competition or the rewards involved. While he may find the game fun and want to play it, he may not learn as much. It is essential, therefore, that in assessing the interest which students have in the educational activity per se, the progress toward the outcomes of the unit must also be considered.

In an earlier study (Phinney and Keislar, 1970) the development and preliminary tryout of a game designed to teach certain function words, including negation and sentential connectives, to four-year-old disadvantaged children was reported.

Using this same "Make-a-Picture Game," the present study attempted to test the hypothesis that the game's features of manipulation and novelty of reward would influence children to choose this activity more frequently than they would an instructional program without these features. It was also hypothesized that children would show gains from

the game approach equal to or greater than those obtained with a straightforward instructional sequence.

An incidental purpose was to obtain, through informal observations of the game situation, a further understanding of children's ability to work independently and to handle game tasks of varying levels of difficulty.

Game Description

The "Make-a-Picture Game" is played by one child, who controls all the materials himself. From the educational perspective, the child is responding to a graduated sequence of questions or cues by selecting the appropriate picture. This multiple-choice pictorial format makes it adaptable to a wide variety of instructional units for young children who are not yet able to read.

The goal of the game for the child is to put together the pieces of a puzzle to make a novel picture. The player assembles a six-piece puzzle using tape recorded cues to select each piece in turn. Each of the puzzle pieces has a picture on both face and back. On the face of the piece is a picture which represents one of the cues supplied on the tape; on the back is part of the goal picture.

At the beginning of each game, the child is presented with a puzzle frame, the six pieces face up showing the picture alternatives, and six cards to supply the corresponding auditory cues. For this purpose, Audio Flashcards accompanying the Electronic Futures Flashcard Reader were used. The child begins by inserting the first flashcard in the Reader. He presses the button and hears a cue sentence calling for the selection of one picture. He can play the flashcard over as many times as he wishes in order to understand it fully. Using the cues

provided in the recorded sentence, the child selects the piece showing the appropriate picture and places it in its proper position in the frame. The puzzle pieces are notched so that only the correct piece will fit in the designated position; if the child makes an error, he immediately realizes it and can correct himself. When the picture is complete the puzzle pieces and cards are replaced with the next set and a new round begins.

For the present investigation, the educational goal was to teach listening comprehension using three linguistic constructions: negation, exclusion, and joint denial. Thus the cue sentences required the child to select from a group of pictures the one which met the requirements of one of the three linguistic constructions:

1. "Find the monkey with no spoon" (negation);
2. "Find the monkey with the spoon but no hat" (exclusion); and
3. "Find the monkey with no ring and no hat" (joint denial).

The complete sequence consisted of five puzzles, each with a different humorous picture on the back. The goal pictures, portraying different experiences of a pet dragon in a social situation, were judged by the adult experimenter to be both novel and interesting to the young child.

For four of these puzzles, two sets of cue sentences were prepared, one set at a more advanced level than the other. This meant that with the five puzzles a total of nine games were played, three games per day. Although children thus saw four of the goal pictures twice, no more than one picture was encountered on the same day.

In an initial game to orient the child to the procedure, only statements of affirmation, such as: "Find the monkey," were used.

The subsequent games involved negation, exclusion, and joint denial. The concluding game offered a review of all three constructions.

Program Description

The programmed instruction unit was prepared to match as closely as possible all features of the game except the two being studied: manipulation and novelty of reward. For each daily session, the child completed one booklet of 18 multiple-choice frames, one frame per page. On each page, the child was to choose the one of three pictures which was described by the cue sentences supplied by a pre-recorded tape. After he heard each sentence, the child marked a spot directly below the picture he chose. This spot was printed with a special "magic" ink (supplied by the A. B. Dick Company) such that if the spot under the correct picture was marked it turned green; if an incorrect choice was marked, the spot turned red. When the spot turned red, the child was instructed to make another choice.

The instructional content of the program was identical to that of the game; the cue sentences and the sequence of presentation were the same. Although the same pictures were used for alternatives in both treatments, the non-replacement feature of the game meant that with the selection of each piece fewer and fewer pictures remained until there was only one left for the final statement.

Comparison of the Two Instructional Treatments

The game and the program were essentially the same in the following ways:

1. Individual mode of presentation;

2. Linear sequence of questions;

3. Set of picture choices provided;

4. Immediate knowledge of results; and

5. Total time allotment (between 10-12 minutes a day for three days).

The differences between the two treatments consisted of the two features of games under study:

1. Manipulation. In the game the child listened to the questions by playing the Audio Flashcard whenever he was ready; he then selected the pieces he needed to respond to the question appropriately and put them in the puzzle. In the program, the child simply listened to the questions and marked his answers.

2. Novelty of Reward. The feature of novelty was built into the game by providing a succession of reinforcements as each piece placed in the puzzle progressively created the novel picture. Apart from knowledge of results given by the chemical feedback, no such reinforcement was offered to the children in the program group.

Criterion Tests

The two major outcomes, listening comprehension and activity preference, were assessed separately. The listening comprehension test was administered both as a pretest and a posttest while the preference test was given only at the end of the experiment.

A. Listening comprehension. To evaluate the language competence of the child, the criterion measure tested the listening comprehension of the linguistic constructions of negation, exclusion, and joint denial. The items for this test used different pictures but similar cue sentences.

PS 005103

In order to give approximately equal advantage to each group, the test items incorporated elements from both the program (three pictures were shown as alternatives for each item) and the game (separate cards were used rather than pages in a booklet). For each item on the test, three picture cards were placed on the table; the subject had to point to the picture described by the cue sentence containing one of the linguistic constructions.

The 27 test items each consisted of a cue sentence and three picture choices. The first six items were used to familiarize subjects with the task and were not included in the scoring; they simply involved an affirmative cue sentence (e.g., "Find the hat"). The remaining 21 items involved negation, exclusion, or joint denial, and were scored on the basis of one point for each correct card selection. Children's errors were not corrected; every child received considerable approval for his efforts.

B. Activity Preference Test. To assess the children's preference for the instructional units, a paired-comparisons test was developed. Comparisons were made among six different classroom activities such as painting at the easel, listening to a story, playing with blocks, playing in the sand box, and either the program or the game, depending on which experimental treatment the child had encountered.

These activities were portrayed by a picture of a child engaged in this experience accompanied by a verbal description. The picture for the experimental treatment showed a child sitting at a table with three game pictures in front of him. Separate sets of pictures were developed for each sex so that boys, for example, saw only boys in the pictures they were shown.

The child was shown two pictures at a time along with a spoken phrase describing each activity and was asked to indicate which one he preferred. For example, he might be shown a picture of a child listening to a story and a picture of a child playing with blocks. He would then be asked, "Would you like to listen to a story or would you like to play with blocks? Point to what you would like to do best."

Since the concern of the experiment was to obtain evidence on preferences for the experimental treatment (game or program), the picture representing the instructional activity was paired with each of the other five pictures once. Of the ten other possible combinations, four were randomly selected and interspersed with the original five pairs. This meant that the child was asked to make a total of nine successive choices between two activities. Since children were given one point for each time they selected the instructional activity over the alternative activity and this comparison occurred only five times, the maximum score for the preference test was five points. This procedure provided the same set of alternatives with which to compare the instructional treatments. Consequently, the preference for game or program could be directly compared even though no child in the experiment had participated in both activities.

Pilot Study

A preliminary tryout of the puzzles and the program was conducted in order to refine the general procedures. The subjects were nine Headstart children with scores of less than 85 per cent on the pretest.

On the basis of random assignment, children were given either the program or the game treatment over a five-day period. There was an average gain of five points in listening comprehension from pretest to posttest. Based on the observations over the tryout period, a number of modifications in procedures were made for the final study.

Method

Subjects. For the main experiment, 27 children in two Head Start classes in a metropolitan area were given both the Peabody Picture Vocabulary Test and the listening comprehension part of the criterion test. Ten of these children were not included because at the outset they demonstrated competence in the language skills which were to be taught. The 17 children who received scores of 17 or less on the pretest (equivalent to 85 percent) were assigned randomly to either the Game or Program group. Since four of the children were unable to complete the experiment because of absences, scores of only 13 were used in the final analyses. The chronological ages of these children ranged from 4-2 to 5-3 with a group mean of 4-10. Their PPVT scores ranged from 33 to 101 with a mean of 71.

Procedure. All children were tested and instructed in a special mobile unit parked outside the room in which the Head Start class was conducted. Children assigned to the game group played three games on each of three successive days, with 18 responses per day. The children in the program group completed one booklet of 18 pages each day, also over three days. Thus each group received the same 18 questions each day, although in a different format. On the day after the instructional treatment had been completed, the children were given listening comprehension and activity preference tests.

Results

A correlation of .73 was obtained between PPVT and Listening Comprehension, using pretest scores for all 27 children originally tested. The fairly strong relationship with the PPVT reflects the language base of both instruments.

The results of the criterion tests are presented in Table 1. Both of the experimental groups showed gains in listening comprehension. The Program group had a mean score of 10.3 on the pretest and 14.3 on the posttest; the Game group scored 13.7 on the pretest and 16.3 on the posttest. Each of these gains is statistically significant. An analysis of covariance, using both PPVT and Listening Comprehension pretest scores as covariates, showed no significant differences between the two groups on this criterion.

On the Activity Preference Test, the Program group selected the program activity over the five alternatives an average of 2.2 times. The Game group, on the other hand, selected the game activity an average of 3.3 times. While the data from this second test showed a difference in the direction predicted by the hypothesis, the analysis of covariance failed to yield a significant F ratio. Thus the hypothesis that these young children would prefer the game more frequently than the program could not be accepted.

Discussion

A major problem with this experiment was the high degree of attrition. Although the number of children originally selected for the study was reasonable, many of them could not be included because they

demonstrated mastery of the skill to be taught. Others had to be excluded because of absences, and thus the final number was probably not large enough to provide a satisfactory test.

In this experimental study, the differences between the two experimental treatments were minimal; the game and the program were very similar except with respect to the two critical features, manipulation and the use of a novel picture as a reward. In a very real sense, these differences may certainly be among the critical ones which distinguish an educational game from an ordinary program. However, the program and the game were alike in so many respects that these two features, at least as presented here, may not have been salient or dramatic enough to create differences in preference.

It should be noted that the program as carried out in this experiment did involve some manipulation: turning the pages in the booklet and marking the picture selected. More important, however, was the fact that the program reinforcement may have had some novel properties. The color feedback used to provide knowledge of results, which becomes a fairly routine procedure after protracted use, may have proved to be exciting for the children. Certainly, seeing a spot turn green or red after being touched by a water pen may, for at least a few days, have had some magical properties. The interest in this transformation may have been sufficient to erode the difference between the two treatment groups on the criterion.

Informal observations of the Game group suggested that these children enjoyed the sense of control they experienced when pushing the lever, and this led to their paying more attention to the cue sentences. The feature of control over the auditory cues was not available to the Program group.

It should also be noted that playing the game required the coordination of a number of different activities: inserting an EFI flashcard and pushing the lever; selecting the correct picture card, turning it over, and putting it in the correct position in a puzzle frame. Many of the children had trouble with these various motor steps of the process and the game required more supervision than was originally anticipated. Manipulation, instead of being perceived as a means by which he could control the situation, could thus have been seen by some children as a threat. However, with experience, these children can be expected to gain in motor proficiency and become more confident in utilizing the advantage of control over their own environment. This increase in autonomy may be an important ultimate outcome from the game, but the limited criteria available provided no evidence on this question.

Contrary to expectation, the pictures formed by completing the puzzles (scenes of children with a friendly dragon in various situations), which adults considered funny, did not have a similar appeal to children. This result suggests the need to determine what characteristics of pictures make them interesting to children.

References

Boocock, S. S. From luxury item to learning tool: An overview of the theoretical literature. In S. S. Boocock and E. O. Schilds (Eds.), Simulation Games in Learning. New York: Sage Publications, Inc., 1968.

Farran, D. C. Competition and learning for underachievers. In S. S. Boocock and E. O. Schild (Eds.), Simulation Games in Learning. New York: Sage Publications, Inc., 1968.

Phinney, J. and Keislar, E. R. An experimental game in oral language comprehension. Technical Report, Headstart Research and Development Center, University of California, Los Angeles, California, Project No. OEO CG 9938, January, 1970.

Table 1

PPVT, Listening Comprehension, and Activity

Preference Scores for Game and Program Groups

	Treatment Groups			
	Game (N= 6)		Program (N= 7)	
	Mean	S.D.	Mean	S.D.
Peabody	76.6	28.9	60.7	17.0
Listening Comprehension				
Pretest	13.7	3.8	10.3	5.2
Posttest	16.3	3.3	14.3	5.9
Activity Preference	3.3	.8	2.2	1.2